WE CLAIM

1. A method of determining a mutagen comprising:

contacting a test compound with a host cell comprising a DNA sequence encoding a fluorescent protein operably linked to a mutagen sensitive gene;

monitoring a host cell preparation for the fluorescent protein; and

determining a mutagen when an amount of the fluorescent protein meets or exceeds a predetermined threshold value.

2. The method of claim 1, wherein the fluorescent protein comprises a green fluorescent protein.

3. The method of claim 2, wherein the fluorescent protein comprises a variant green fluorescent protein.

4. The method of claim 1, wherein the fluorescent protein comprises a variant fluorescent protein.

5. The method of claim 1, wherein the mutagen sensitive gene comprises an SOS gene.

6. The method of claim 5, wherein the mutagen sensitive gene comprises a variant SOS gene.

7. The method of claim 1, wherein the mutagen sensitive gene comprises a variant mutant sensitive gene.

8. The method of claim 1, wherein contacting comprises diluting the host cell and incubating at 37 °C with shaking.

9. The method of claim 1, wherein contacting comprises growing the host cell at logarithmic phase.

10. The method of claim 1, wherein contacting comprises growing the cell at stationary phase.

11. The method of claim 1, wherein contacting comprises depleting a nutrient.

12. The method of claim 11, wherein contacting comprises starving the host cell.

13. The method of claim 1, wherein contacting comprises incubating host cell with a range of concentrations of the test compound.

14. The method of claim 1, wherein monitoring comprises detecting fluorescence.

15. The method of claim 14, wherein detecting fluorescence comprises employing a fluorescence detector reading samples in a 96-well microtiter plate.

16. The method of claim 14, wherein detecting fluorescence comprises exciting at a wavelength comprising 485 nm and detecting emission at a wavelength comprising 510 nm, 520 nm, or a combination thereof.

17. The method of claim 1, wherein determining comprises statistically analyzing the amount or distribution of green fluorescent protein.

18. The method of claim 17, wherein statistically analyzing comprises analyzing a difference in a location of a data distribution, a difference in a shape of a data distribution, or a combination thereof.

19. The method of claim 18, wherein statistically analyzing comprises conducting

a Kolmogorov-Smirnov Z Test.

20. The method of claim 19, wherein a P value of less than about 0.05 determines presence of a mutagen.

21. The method of claim 1, wherein determining comprises comparing the amount of green fluorescent protein in a host cell contacted with a test compound to a host cell contacted with a control substance.

22. The method of claim 1, further comprising providing the host cell.

23. The method of claim 22, wherein providing comprises growing the host cell to reach logarithmic phase and diluting the host cell.

24. The method of claim 22, wherein providing comprises growing the host cell to reach stationary phase.

25. A method of determining a mutagen comprising:

contacting a test compound with a host cell comprising a DNA sequence encoding a fluorescent protein operably linked to a mutagen sensitive gene;

monitoring a host cell preparation for the fluorescent protein; and

statistically analyzing the amount or distribution of green fluorescent protein.

26. The method of claim 25, wherein statistically analyzing comprises analyzing a difference in a location of a data distribution, a difference in a shape of a data distribution, or a combination thereof.

27. A method of determining a mutagen comprising:

contacting a test compound with a host cell comprising a DNA sequence encoding a fluorescent protein operably linked to a mutagen sensitive gene;

monitoring a host cell preparation for the fluorescent protein; and

statistically analyzing the amount of green fluorescent protein by analyzing a difference in a location of a data distribution, a difference in a shape of a data distribution, or a combination thereof.

28. A recombinant host cell comprising a DNA encoding a fluorescent protein operably linked to a mutagen sensitive gene.

29. The recombinant host cell of claim 28, comprising a DNA encoding a green fluorescent protein.

30. The recombinant host cell of claim 28, wherein the mutagen sensitive gene comprises an SOS gene.

31. The recombinant host cell of claim 28, wherein the host cell comprises an *E. coli*, a *Salmonella typhimurium*, a yeast, or a mammalian cell.

32. The recombinant host cell of claim 28, wherein the SOS gene comprises a umuDC operon.

33. The recombinant host cell of claim 32, wherein the umuDC operon comprises bases 1 to 968 of an *E. coli* umuDC operon (SEQ ID NO:_____).

34. The recombinant host cell of claim 29, wherein the coding sequence for a green fluorescent protein comprises the coding sequence from *A. victoria*.

35. The recombinant host cell of claim 34, wherein the coding sequence for a green fluorescent protein comprises the sequence of SEQ ID NO:_____.

36. The recombinant host cell of claim 28, comprising plasmid pTJgfp.

37. The recombinant host cell of claim 28, comprising a DNA sequence encoding a variant fluorescent protein.

38. The recombinant host cell of claim 28, wherein the mutagen sensitive gene comprises a variant mutagen sensitive gene.

39. The recombinant host cell of claim 38, wherein the mutagen sensitive gene comprises a variant SOS gene.

40. A DNA construct comprising a mutagen sensitive gene operably linked to a coding sequence for a fluorescent protein.

41. The DNA of claim 40, wherein the mutagen sensitive gene comprises an SOS gene.

42. The DNA of claim 41, wherein the SOS gene comprises a umuDC operon.

43. The DNA of claim 40, wherein the coding sequence for a fluorescent protein encodes a green fluorescent protein.

44. An expression vector comprising the DNA of claim 40.

45. A recombinant host cell comprising the DNA of claim 40.

46. The DNA of claim 40, comprising a variant mutagen sensitive gene.

47. The DNA of claim 40, comprising a coding sequence for a variant fluorescent protein.

48. An expression vector comprising plasmid pSE117 and a coding sequence for a fluorescent protein.

49. The expression vector of claim 48, comprising a coding sequence for a green fluorescent protein.

50. The expression vector of claim 49, wherein the coding sequence for a green fluorescent protein replaces a sequence of the plasmid pSE117.

51. The expression vector of claim 49, wherein the coding sequence for a green fluorescent protein is ligated to a fragment from the plasmid pSE117 between a unique HindIII restriction site and a unique EcoR1 restriction site.

52. The expression vector of claim 48, comprising plasmid pTJgfp.

53. A recombinant host cell comprising the expression vector of claim 48.

54. The expression vector of claim 48, comprising a coding sequence for a variant fluorescent protein.

55. A polypeptide comprising an amino acid sequence of a UmuD protein, a UmuC protein, or a combination thereof and an amino acid sequence of a fluorescent protein.

56. A method of determining an antimutagen comprising:

contacting a test compound and a mutagen with a host cell comprising a DNA sequence encoding a fluorescent protein operably linked to a mutagen sensitive gene;

monitoring a host cell preparation for the fluorescent protein; and

determining a mutagen when an amount of the fluorescent protein falls below a predetermined threshold value.